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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/668,899	09/22/2003	Naixiong Jiang	VT0328-US1	2498

24473 7590 08/02/2006

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EXAMINER

WILKINS III, HARRY D

ART UNIT	PAPER NUMBER
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1742

DATE MAILED: 08/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/668,899

Applicant(s)

JIANG ET AL.

Examiner

Harry D. Wilkins, III

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 June 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) 30-32 and 34-37 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-29 and 33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status

1. All previous rejection grounds have been maintained.

Claim Interpretation

2. With respect to the new claim limitation "cathode foil", the Examiner wishes to clarify the record. "Cathode foil" as utilized by Applicant is meant to mean that the metal foil is utilized as the cathode when the solid electrolytic capacitor is completed. During the electropolymerization process the metal foil is made anodic, but the electrical bias during the polymerization process was not used for the naming convention. Further, it should be noted that Harakawa et al teach (see col. 8, lines 23-29) that the disclosed solid electrolytic capacitors were characterized by non-polarity. Thus, the aluminum foil utilized by Harakawa et al was capable of use as either an anode foil or as a cathode foil in the completed electrolytic capacitor. As such, the term "cathode foil" limits the claim only to using a metal foil as the substrate for deposition, since "cathode" and "anode" were merely the intended use of the foil in the produced electrolytic capacitor.
3. In regards to Applicant's remarks about the present electrode being suitable for "wet" electrolytic capacitors, the recitation in the claims of "for use in an electrolytic capacitor comprising an anode foil, a cathode foil and a separator material therebetween impregnated with an electrically conductive electrolyte" is merely the intended use of the claimed "cathode foil". As such, Applicant's remarks are not deemed to limit the scope of the invention since the argued features do not appear in the claims. If Applicant wishes to clearly define this feature of the present invention it is

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suggested that the claims be amended to include an additional method step of taking the formed cathode foil and combining it with an anode foil and the separator material to form a solid electrolytic capacitor. However, as the present rejection closes prosecution, such amendment would not be entered in an amendment under 37 CFR1.116.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 28 and 33 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Naito et al (US 6,882,522/US 2004/0233614).

Naito et al anticipate the invention as claimed. Naito et al teach (see examples 1 and 11) an example where an electrode was placed in an aqueous solution of ethylenedioxythiophene monomer and subjecting the electrode to an electric current such that a polyethylenedioxythiophene coating was formed by electrolytic polymerization.

[It is noted that the effective filing date of Naito et al is considered to be 10 February 2003, the filing date of 60/445,820. A review of that application shows the same examples (1 and 11) in paragraphs 24 and 27.]

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Regarding claim 28, the electrode material was niobium.

Regarding claim 33, since Naito et al teach forming the same PEDT film, one of ordinary skill in the art would have considered the coating to inherently enhance the surface area of the electrode.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-4, 6-19, 23-24, 26-28 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harakawa et al (US 4,805,074) in view of Wheeler et al (US 6,136,176) and Groenendaal et al (US 6,852,830/US 2003/0176628).

Harakawa et al teach (see abstract, col. 5, lines 36-52 and col. 21, lines 16-23) making a coating on a valve metal (aluminum) foil electrode by placing the aluminum foil in a solution of a thiophene monomer and performing electrolytic polymerization to form a polythiophene coating on the aluminum foil.

Thus, Harakawa et al fail to expressly teach using ethylenedioxythiophene as the thiophene monomer.

Wheeler et al teach (see abstract and col. 3, lines 51-55) another valve metal electrode for formation of capacitors where poly(3,4-ethylenedioxythiophene) was the most preferable conductive polymer for use in the capacitor.

Therefore, it would have been obvious to one of ordinary skill in the art to have selected 3,4-ethylenedioxythiophene as the thiophene monomer in the process of Harakawa et al because Wheeler et al teach that the ethylenedioxy- monomer was considered the conductive polymer with the most beneficial properties in the formed electrolytic capacitor.

Further, Harakawa et al teach using acetonitrile as the solvent, thus failing to teach using an aqueous solution.

Groenendaal et al teach (see col. 14) that in the electrochemical polymerization of thiophenes, many inert liquids were available as the solvent, including water, alcohols and nitriles such as acetonitrile.

Therefore, it would have been obvious to one of ordinary skill in the art to have substituted water as the solvent for the solution as suggested by Groenendaal et al for the acetonitrile taught by Harakawa et al because Groenendaal et al expressly teach that water and acetobitrile were functionally equivalent solvents in the electrolytic polymerization of thiophenes.

Regarding claims 2 and 10, Harakawa et al teach (see col. 6, lines 7-49) utilizing doped monomers to form doped polymeric films. Further, since Groenendaal et al teach that many suitable solvents were available, one of ordinary skill in the art would have found it obvious to have utilized a mixture of two or more cosolvents, such as water and alcohols or water and acetonitrile.

Regarding claims 3-4, Harakawa et al were silent as to the concentrations of the thiophene monomer and the dopant. However, it would have been obvious to one of

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ordinary skill in the art to have optimized the concentrations of the monomer and the dopant in order to create optimum conductive polymer films.

Regarding claims 6-9, Groenendaal et al teach (see col. 14) that electrolytic additives were known in the art for providing desired properties in thiophene electropolymerization, including tetrafluoroborate salts, tosylate (i.e.-salts of p-toluenesulfonate) or perchlorate salts.

Regarding claim 11, it would have been obvious to one of ordinary skill in the art to have optimized the ratio of the solvent and cosolvent for achieving optimum film formation characteristics.

Regarding claims 12-19, Harakawa et al teach that the solution for the electropolymerization could have included beneficial supporting electrolyte additives, such as (see col. 14) (2) an aliphatic compound having two or more carbonyl groups and (3) an aliphatic compound having at least one hydroxyl group and at least one carboxylic acid group. The genus of group 2 included dicarboxylic acids. Therefore, absent evidence of unexpected results, it would have been obvious to one of ordinary skill in the art to have chosen an optimum dicarboxylic acid to be added to the solution. The genus of group 3 included combined hydroxyl-carboxylic acids. Therefore, absent evidence of unexpected results, it would have been obvious to one of ordinary skill in the art to have chosen an optimum hydroxyl-carboxylic acid to be added to the solution.

Regarding claim 23, Groenendaal et al teach (see col. 15, lines 4-10) using current densities in the range of 0.01-40 mA/cm².

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Regarding claim 24, it would have been obvious to one of ordinary skill in the art to have optimized the duration of the application of current in order to achieve the desired thickness of polyethylenedioxythiophene film.

Regarding claims 26-27, Harakawa et al teach (see col. 20) chemically etching the aluminum substrate prior to immersing it in the electropolymerization solution.

Regarding claim 28, Harakawa et al teach (see abstract) that the electrode valve metal was selected from aluminum, tantalum, niobium or titanium.

Regarding claim 33, since Harakawa et al in view of Wheeler et al and Groenendaal et al teach forming the same PEDT film, one of ordinary skill in the art would have considered the coating to inherently enhance the surface area of the electrode.

8. Claims 5-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harakawa et al (US 4,805,074) in view of Wheeler et al (US 6,136,176) and Groenendaal et al (US 6,852,830/US 2003/0176628) as applied to claim 2 above and further in view of Tanaka et al (JP 02-218716).

The teachings of Harakawa et al, Wheeler et al and Groenendaal et al are described above.

However, Harakawa et al, Wheeler et al and Groenendaal et al do not teach using a sulfate dopant in the electropolymerization solution.

Tanaka et al teach (see English abstract) forming a conductive polythiophene film by electropolymerization and doping the polymer with various anions, such as

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tetrafluoroborate, perchlorate, hexafluorophosphate, hexafluoroarsenate, sulfate or p-toluenesulfonate.

Therefore, it would have been obvious to one of ordinary skill in the art to have incorporated the conventional doping ions into the electropolymerized film of Harakawa et al and Wheeler et al because the known doping agents provided various desired customization of the formed polymeric films.

9. Claims 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harakawa et al (US 4,805,074) in view of Wheeler et al (US 6,136,176) and Groenendaal et al (US 6,852,830/US 2003/0176628) as applied to claim 2 above and further in view of Jasne (US 4,724,053).

The teachings of Harakawa et al, Wheeler et al and Groenendaal et al are described above.

However, Harakawa et al, Wheeler et al and Groenendaal et al do not teach using a surfactant in the electropolymerization solution.

Jasne teaches (see col. 2, lines 15-50, the paragraph spanning cols. 3 and 4 and col. 6, lines 24-58) using a surfactant, such as dioctyl sodium sulfosuccinate, in an electropolymerization reaction in a solution of water and cosolvent alcohol, wherein the function of the surfactant was to ensure an emulsification of the monomer in solution and also to maintain an anionic character of the to be deposited monomer to ensure that the monomer is urged towards the anodic substrate.

Therefore, it would have been obvious to one of ordinary skill in the art to have included a surfactant as taught by Jasne in the electropolymerization solution of

Harakawa et al because the surfactant ensured emulsification of the monomer in solution and also maintained an anionic character of the to be deposited monomer to ensure that the monomer is urged towards the anodic substrate. It would have been obvious to one of ordinary skill in the art to have found the optimum quantity of added surfactant for achieving the disclosed functions.

10. Claims 25 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harakawa et al (US 4,805,074) in view of Wheeler et al (US 6,136,176) and Groenendaal et al (US 6,852,830/US 2003/0176628) as applied to claim 1 above and further in view of Yodice (US 4,839,322).

The teachings of Harakawa et al, Wheeler et al and Groenendaal et al are described above.

However, Harakawa et al, Wheeler et al and Groenendaal et al do not teach controlling the current density in the electropolymerization solution or applying the current for multiple iterations.

Yodice teaches (see col. 16, lines 12-29) discuss various aspects of electropolymerization reactions, particularly that the applied current density could have had an affect on the morphology of the deposited polymer.

Therefore, it would have been obvious to one of ordinary skill in the art to have optimized the applied current density in the electropolymerization method of Harakawa et al because one of ordinary skill in the art was aware that the current density in electropolymerization reactions affected the morphology of the deposited polymer.

Response to Arguments

11. Applicant's arguments filed 26 June 2006 have been fully considered but they are not persuasive. Applicant argued that the Examiner has failed to provide a suggestion or motivation to combine the teachings of Harakawa et al with the teachings of Wheeler et al and/or Groenendaal et al.

In response, as indicated in the rejection grounds of the previous office action and reiterated above, Wheeler et al teach the selection of poly(3,4-ethylenedioxythiophene) as the most preferable conductive polymer for use in solid electrolytic capacitors. Thus, Wheeler et al clearly makes the suggestion for the combination. Groenendaal et al teach that in the electrochemical polymerization of thiophenes, many inert liquids were available as the solvent, including water, alcohols and nitriles such as acetonitrile. Thus, Groenendaal et al clearly makes the suggestion to one of ordinary skill in the art that it was acceptable to use the acetonitrile solution of Harakawa et al with water as a co-solvent.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not

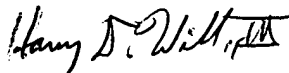
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mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D. Wilkins, III whose telephone number is 571-272-1251. The examiner can normally be reached on M-F 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V. King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Harry D Wilkins, III
Primary Examiner
Art Unit 1742

hdw